

THURSDAY, JANUARY 30, 1908.

THE FUNCTION OF THE STAPES.

On the Impulses of Compound Sound Waves and their Mechanical Transmission through the Ear.

By Sir Thomas Wrightson, Bart. Pp. 40, and portfolio of diagrams. (London: Thomas Kell and Son, 1907.)

LITTLE has been added to our knowledge of the auditory ossicles since the classical researches of Helmholtz, although the subject is of much interest. Sir Thomas Wrightson shows that, owing to the peculiar arrangement of the footplate of the stapes and the formation of the annular membrane, to and fro movements of the stapes are accompanied by vigorous transverse vibrations of its frame. These movements will be represented in any compound wave form by the points at which "the compound curve cuts across the average line representing the central or normal position of the membrane."

With the help of a very ingenious model, evidence is adduced that this complex of motions affords a reasonable basis for the analysis of compound notes, which is usually attributed to the fibres of the basilar membrane. Careful examination of the numerous wave forms reproduced by the author will, we think, make it clear that the theory advocated is worthy of attention. Sir Thomas Wrightson's criticism of the theory associated with the name of Helmholtz is not, however, entirely just. The statement that "In fact there is no intelligible explanation furnished by Helmholtz's theory why we can hear each note of a combination when all the component notes are sounded together" can be made with respect to any theory whatever. The real value of the hypothesis of Helmholtz is that it describes, not explains, a large series of phenomena which cannot easily be reconciled with rival theories. It remains to be seen whether Sir Thomas Wrightson's theory will better describe the facts. For example, the peculiar condition described by Jacobson under the name *Diplacusis binauralis dysharmonica*, in which the same note heard by the two ears simultaneously produces a dissonance, is most easily described by a theory of resonators in the cochlea. Again, if it be true that ossification of the fenestra ovalis is consistent with a partial preservation of hearing, as asserted by K. Schaefer (apparently on the authority of Frutiger), the function of the stapes would seem to be relatively unimportant; but evidence on this point is conflicting. The author assumes that an impulse is always imparted to the membrana basilaris by friction of the perilymph on its under surface; this is not necessarily the case. As Schaefer remarks:—

"It is conceivable that the fluid of the labyrinth, receding before the pressure of the stapes, flows from the Scala Vestibuli through the Helicotreme into the Scala Tympani, and conversely when rarefaction

occurs in the auditory passage. But there is no time for this during the rapid sound vibrations, and it is far more probable that the membranous partition of the Cochlea bulges towards the Scala Tympani when the stapes moves inwards."

Whatever position may ultimately be assigned to the theory of stapelial analysis, Sir Thomas Wrightson and Dr. Arthur Keith, who is responsible for the anatomical part of the work, are to be congratulated on the performance of an interesting research which throws much light on the mode of action of a structure not readily accessible to the physiologist.

M. G.

LIFE AND DEATH.

The Prolongation of Life. By Elie Metchnikoff. The English translation edited by P. Chalmers Mitchell. Pp. xx+343. (London: W. Heinemann, 1907.) Price 12s. 6d. net.

MOST people desire to live long, and hence Prof. Metchnikoff's book is sure to have many readers. He not only discusses the means by which life may be prolonged, but he also examines the question whether it is desirable to prolong it. About this he has no doubt; he is a confirmed optimist, and points triumphantly to celebrated men who have begun life as pessimists and have ended it as optimists. The chief of these is Goethe. Several chapters are devoted to the consideration of Faust, the sorrows of Werther, and Goethe's life. But this part of the book and that which treats of morality will probably appeal to fewer readers than the earlier part, for the subjects are so vast and so difficult that it is not easy to deal with them in the short space given to them by the author.

It is of interest to observe that Prof. Metchnikoff carries his optimism to the point of thinking that living has become easier from a moral point of view owing to the advances of science. For example, as science gets rid of or improves the treatment of plague and diphtheria, there will no longer be any need of the high moral courage of those who went freely among sufferers from these scourges in order that they might alleviate them. Life is already so difficult that this is a point of view we commend to the consideration of those who oppose scientific workers, and hinder them by vexatious restrictions.

"The Prolongation of Life" is a remarkable book in many ways. It and the "Nature of Man," of which it is an extension, treat of a subject about which little has been written. The whole range of literature is ransacked by the author, and the facts and opinions collected are discussed with an originality, a width of view, and knowledge that give the book an especial fascination and constantly arrest the attention.

Prof. Metchnikoff is of opinion that when old age approaches, the phagocytes, which have hitherto been man's friends, become his enemies, and hasten death by devouring the essential cells of the vital organs of the body, especially those of the nervous system.

These cells are rendered particularly vulnerable to phagocytes by the action of poisons manufactured by the bacteria of the large intestine, and Prof. Metchnikoff suggests that this might to a large extent be prevented by taking skimmed milk which has been boiled and rapidly cooled, and on which pure cultures of the Bulgarian bacillus have been sown. This produces a pleasant, sour, curdled milk containing about 10 grams of lactic acid per litre, the lactic acid of which prevents intestinal putrefaction.

The author is dependent mainly upon two kinds of evidence, experimental and numerical, and therefore his difficulties are chiefly two. Many experiments which might bear upon the prolongation of life must necessarily be observed for many years. For example, he devotes much space to the uselessness of the large intestine; so far as his facts go there is nothing to be said against them—indeed, from them and others we are probably justified in thinking poorly of the large intestine—but before we can certainly know much about this numbers of human beings who have been deprived of their large intestine will have to be observed for many years.

As the question is the prolongation of life, the numerical evidence as to how long certain animals and plants live is of the greatest importance, but the author has to depend largely upon hearsay. Very few of his statements are evidence in the technical sense of the word. We are more likely to be correct in our knowledge of very old human beings than very old animals, but even with regard to human beings the evidence of extreme old age—say over 100 years—often breaks down when carefully examined. Those in doubt on this point should read T. E. Young "On Centenarians." Sometimes the age is accepted because it is on the tombstone, but, as Johnson says, "In lapidary inscriptions a man is not upon oath." Prof. Metchnikoff is inclined to accept the commonly stated age of Parr, but there is no real evidence as to his age at death. Still, when we remember the extreme difficulty of getting suitable facts to support his views it must be admitted that the author has shown marvellous skill in the presentation of his case. No one can put down the book without feeling that it makes us think, will well repay careful critical reading, and induces gratitude to Dr. Chalmers Mitchell for his translation and excellent introduction.

PHILOSOPHICAL ESSAYS.

Proceedings of the Aristotelian Society. New Series, Vol. vii., 1906-7. Pp. iv+244. (London: Williams and Norgate, 1907.) Price 10s. 6d. net.

THIS volume contains the papers read before the society during the twenty-eighth session, 1906-7. The papers are eight in number, with titles and authors as follows:—(1) Nicholas de Ultricuria, a Mediæval Hume, by Hastings Rashdall; (2) on the nature of truth, by the Hon. Bertrand Russell; (3) on causal explanation, by T. Percy Nunn; (4) logic and identity in difference, by Miss E. E. Constance Jones; (5) Humism and humanism, by F. C. S. Schiller; (6)

fact, idea, and emotion, by Shadworth H. Hodgson; (7) intuition, by A. T. Shearman; (8) philosophy and education, by Benjamin Dumville.

Both in the subjects chosen and in the standpoints adopted for their discussion, the series is quite representative of modern English philosophy. In the first paper, by the late president of the society, we find that element of historical appreciation, one might almost call it antiquarianism, without which English philosophy would be reft of half its distinctive charm. The second is virtually a criticism of Joachim's recent "Essay on Truth." The monistic theory championed in that book, viz. that "only the whole truth is wholly true," is shown to rest upon an assumed "axiom of internal relations," which may be formulated as follows:—"Every relation is grounded in the natures of the related terms." The arguments in its favour are shown to be fallacious, and the way is thus cleared for a return to the dualistic theory that facts are completely independent of our knowledge of them—that experiencing does *not* make a difference to the facts. Finally, two theories, each admitting the possibility of a plurality of truths, are mapped out as tenable, between which the author prefers not to decide. The third paper is a very thorough and lucid treatment of the methods of explanation adopted in the various sciences, and should be found useful by those interested in the more concrete side of epistemology. Miss Constance Jones's paper is good, but too technical in nature to receive further mention here. In his paper, Dr. Schiller devotes many pages to the orientation of the pragmatic philosophy, defending it especially against the charge of kinship with the empirical scepticism of Hume. Particularly good is his exposition of Hume's theory of "activity," a portion of Hume's system unduly slurred over by the historian of philosophy. To his own panegyric of voluntarism the best antidote is to be found in the following paper (No. 6), by Dr. Shadworth Hodgson. This paper is excellent. However untenable one may feel some of his conclusions to be, one cannot but admire the clearness of conception and the feeling for reality which Dr. Hodgson displays. The analysis is carried out under the influence of the fundamental antithesis of "real conditions" and "conditionates." It is attempted to show that consciousness is a conditionate of which the real conditioning is to be looked for in something which is not consciousness. "This 'something' is known to us as matter and motions of matter"; therefore, says Dr. Hodgson, it is not a thing-in-itself. His argument takes no account of the alternative possibility that the reality of which matter is the phenomenon is itself mental, and that the efficiency of matter is really mental efficiency.

Mr. Shearman's paper is an attempt to map out the position of intuition in philosophy, and is extremely suggestive. In the last paper of the series we meet the well-needed reminder that philosophy is still indispensable in any theory of education. Philosophy alone is fitted to preside over the ideals which all educational systems must recognise.

W. B.